Topical Outline for Calculus AB

The following is an outline of the topics that should be learned in an AB Calculus
Class, and therefore will be tested on the examination.

I. Functions, Graphs, and Limits

Analysis of graphs. Emphasis on interplay between the geometric
and analytic information to predict and explain a function.

Limits of Functions (including one-sided limits)

· An understanding of the limiting process

· Calculating limits using algebra

· Estimating limits and graphs from graphs or tables of data

Asymptotic and unbounded behavior

· Understanding asymptotes in terms of graphical behavior

· Describing asymptotic behavior in terms of limits involving infinity

· Comparing relative magnitudes of functions and their rates of change

Continuity as a property of functions

· An intuitive understanding of continuity

· Understanding continuity in terms of limits

· Geometric understanding of graphs of continuous functions

II. Derivatives

Concept of the derivative

· Derivative presented geometrically, numerically, and analytically

· Derivative interpreted as an instantaneous rate of change

· Derivative defined as the limit of the difference quotient

Derivative at a point

· Slope of a curve at a point

· Tangent line to a curve at a point and local linear approximation

· Instantaneous rate of change as the limit of average rate of change

· Approximate rate of change from graphs and tables of values

Derivative as a function

· Corresponding characteristics of graphs of f and f’

· Relationship between the increasing and decreasing behavior of f and the sign of f’

· The Mean Value Theorem and it’s geometric consequences

· Equations involving derivatives

Second derivatives

· Corresponding characteristics of the graphs f , f’, and f’’

· Relationship between the concavity of f and the sign of f’

· Points of inflection as places where concavity changes

Applications of derivatives

· Analysis of curves

· Optimization , both absolute and relative extrema

· Modeling rates of change

· Use of implicit differentiation to find the derivative of an inverse function

· Interpretation of the derivative as a rate of change

Computation of derivatives

· Knowledge of derivatives of basic functions

· Basic rules for the derivative of sums, products, and quotients of functions

· Chain rule of implicit differentiation

III. Integrals

Interpretations and properties of definite integrals

· Computation of Riemann sums

· Definite integral as a limit of Riemann sums

· Definite integral of the rate of change of a quantity over an interval

· Basic properties of definite integrals

Fundamental theorem of calculus

· Use of the fundamental theorem to evaluate definite integrals

· Use of the fundamental theorem to represent functions

Techniques of anti-differentiation

· Anti-derivatives following directly from derivatives of basic functions

· Anti-derivatives by substitution of variables

Applications of anti-differentiation

· Finding specific anti-derivatives using initial conditions

· Solving separable differential equations and using them in modeling

The Examination

Section 1. A multiple choice section testing proficiency in a wide variety of topics

Section 2. A free response section requiring the student to demonstrate the
ability to solve problems involving a more extended chain of reasoning.

-must show work in free-response sections

Graphing Calculator Capabilities for the Examination:

1. Plot the graph of a function within a viewing window.

2. Find the zeros of a function.

3. Numerically calculate the derivative of a function.

4. Numerically calculate the value of a definite integral.

--memory will not be cleared

--Non-graphing scientific calculators, computers, devices, with a QWERTY
keyboard and electronic writing pads are not allowed.